~~PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390~~

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

December 14, 2016

10 CFR 50.55a

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 16-448
NRA/GDM R2
Docket Nos. 50-280/281
License Nos. DPR-32/37

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
PROPOSED ALTERNATIVE TO ASME SECTION XI REQUIREMENTS FOR REPAIR/REPLACEMENT OF CIRCULATING AND SERVICE WATER CLASS 3 BURIED PIPING IN ACCORDANCE WITH 10 CFR 50.55a(z)(1)

Pursuant to 10 CFR 50.55a(z)(1), Virginia Electric and Power Company (Dominion) hereby requests Nuclear Regulatory Commission (NRC) approval of a proposed inservice inspection (ISI) alternative to allow the use of a Carbon Fiber Reinforced Polymer (CFRP) system for the internal repair of buried Circulating Water (CW) and Service Water (SW) systems' piping at Surry Power Station (Surry) Units 1 and 2. Specifically, for this activity, ASME Section XI, IWA-4221(b) requires repair/replacement piping to meet the original Construction Code requirements for the CW and SW piping. However, the applicable Construction Code for Surry does not provide the requirements for the design, fabrication, installation, examination and testing of CFRP in buried piping. Consequently, an NRC approved alternative is required to permit the use of a CFRP system for the internal repair of the CW and SW systems' buried piping that provides the same level of quality and safety.

Repair of the existing CW and SW carbon steel piping with a CFRP system will provide an overall benefit to plant safety, since CFRP is more resistant to fouling and microbiologically induced corrosion, while providing the requisite pressure boundary safety function and improving long-term system reliability. The proposed alternative is provided in Enclosure 1. Additional information in support of the requested alternative is provided in Enclosures 2 through 9.

Surry Units 1 and 2 are presently in their fifth inservice inspection (ISI) intervals which end on October 13, 2023 and May 9, 2024, respectively. As further discussed in the enclosed alternative request and supporting information, this repair effort will be performed during the fifth 10-year ISI intervals for Surry Units 1 and 2, with the exception of one section of common piping that will be replaced during the Unit 1 sixth 10-year ISI interval.

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NRR

ENCLOSURES 1, AND 4 THROUGH 9 ~~CONTAIN PROPRIETARY INFORMATION THAT IS BEING WITHHELD FROM PUBLIC DISCLOSURE UNDER 10 CFR 2.390.~~
UPON SEPARATION OF ENCLOSURES 1 AND 4 THROUGH 9, THIS LETTER IS DECONTROLLED.

Enclosures 1 and 4 through 9 contain supporting technical information for the proposed alternative request prepared by Structural Group, Inc., and Simpson Gumpertz & Heger, Inc. that includes information proprietary to these two companies. Therefore, this information is supported by affidavits, signed by Structural Group, Inc., and Simpson Gumpertz & Heger, Inc., the owners of the information. The affidavits set forth the bases by which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information, which is proprietary to Structural Group, Inc., and Simpson Gumpertz & Heger, Inc., be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. The affidavits are included in Structural Group, Inc., and Simpson Gumpertz & Heger, Inc. letters to the NRC entitled, "Application for Withholding Proprietary Information from Public Disclosure," and "Withholding of Certain Proprietary Information Pursuant to 10 CFR 2.390," dated November 23, 2015 and November 30, 2016, respectively. The Structural Group, Inc., and Simpson Gumpertz & Heger, Inc. authorization letters are provided in Enclosure 10. In conformance to the requirements of 10 CFR 2.390 concerning the protection of proprietary information, the proprietary information included in Enclosure 1 is contained within brackets with the associated bases for the withholding of the proprietary information indicated directly before the information to withheld. As Enclosures 4 through 9 are considered to be proprietary in their entirety, these enclosures have been marked in the manner authorized by 10 CFR 2.390(b)(1)(i)(A).

To provide sufficient time for planning the CW and SW piping repair and to provide assurance of the planned approach, Dominion respectfully requests NRC review and approval of the enclosed ISI alternative by December 15, 2017.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,

Mark Sartain
Vice President - Nuclear Engineering

Commitments contained in this correspondence: None

Enclosures (11)

1. Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1) **[Proprietary]**

1A. Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1) **[Redacted - Non-proprietary]**

2. Draft Scope and Schedule Summary for Internal Repair of CW and SW Buried Piping using a CFRP System

3. Definition of Terms and Acronyms, Internal Repair of Buried Piping using a Carbon Fiber Reinforced Polymer System

4. Material Manufacturing and Material Qualification, Internal Repair of CW and SW Buried Piping using a CFRP System **[Proprietary]**

5. Design of Piping Repair for Plant CW and SW Class 3 Buried Piping using a CFRP System **[Proprietary]**

6. Sample Installation and QA/QC Procedures - Repair of Plant CW and SW Class 3 Buried Piping using a CFRP System **[Proprietary]**

7. Sample Training Plans for Repair of Plant CW and SW Class 3 Buried Piping using a CFRP System **[Proprietary]**

8. Failure Mode Effects Analysis - Repair of Plant CW and SW Class 3 Buried Piping using a CFRP System **[Proprietary]**

9. Operating Experience **[Proprietary]**

10. Applications for Withholding Proprietary Information From Public Disclosure

cc: U.S. Nuclear Regulatory Commission
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ENCLOSURE 1A

Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1)

[NON-PROPRIETARY]

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

Virginia Electric and Power Company (Dominion)
Surry Power Station Units 1 and 2
Fifth and Sixth 10-Year Inservice Inspection Intervals (Unit 1)
Fifth 10-Year Inservice Inspection Interval (Unit 2)

Proposed Alternative
in Accordance with 10 CFR 50.55a(z)(1)

1. Plant Site – Units

Surry Power Station Units 1 and 2

2. Interval Dates

The proposed alternative is requested for:

- The Surry Unit 1 fifth 10-year inservice inspection (ISI) interval that began on December 14, 2013 and ends on October 13, 2023, except for a Service Water (SW) line common to Surry Units 1 and 2,
- The Unit 2 fifth 10-year ISI Interval which began on May 10, 2014 and ends on May 9, 2024, and
- The Surry Unit 1 sixth 10-year ISI interval that begins on October 14, 2023 and ends on October 13, 2033, for the repair of a SW line common to Surry Units 1 and 2.

3. Requested Date for Approval

The requested date for approval is December 15, 2017.

4. ASME Code Components Affected

a) ASME Code Class 3

b) The affected piping consists of:

   i) 96-inch Circulating Water (CW) System Inlet Piping from the Station Intake Canal to the Main Steam Condenser.
   ii) 24, 30, 36, 42, 48-inch SW pipe headers from the CW system to the Recirculation Spray (RS) and Component Cooling (CC) Heat Exchangers' (HXs) supply lines.

c) These lines are concrete-encased and buried. The concrete encasement of the piping systems is a Seismic Category I structure and provides the seismic support for the piping systems.

d) The piping was fabricated of carbon steel material conforming to ASTM A-283 Gr. B in accordance with AWWA C201, "Standard Specification for Electric Fusion Welded Steel Water Pipe."

e) The piping was designed and installed in accordance with ASME B31.1 -1967, "USAS Code for Pressure Piping."

f) A detailed listing of the piping sections to be replaced is provided in Enclosure 2, which identifies the pipe number, size, configuration, function and preliminary construction schedule.

5. Applicable Code Edition and Addenda

ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", 2004 Edition, No Addenda (Reference 1), for the Surry Units 1 and 2 fifth 10-year ISI intervals. The ASME Section XI Code Edition for the Surry Unit 1 sixth 10-year ISI interval has yet to be determined.

6. Applicable Code Requirement

The ASME Code requirement applicable to this activity of repairing carbon steel piping is ASME Section XI, Article IWA-4000, subparagraph IWA-4221(b)(1), which specifies the following requirement:

IWA-4221(b) An item to be used for repair/replacement activities shall meet the Construction Code specified in accordance with (1), (2), or (3) below.

(1) When replacing an existing item, the new item shall meet the Construction Code to which the original item was constructed.

7. Reason for Request

The use of a Carbon Fiber Reinforced Polymer (CFRP) system for internal repair of buried ASME pipe applications is a recent technology improvement that was not available in the 1960's or 1970's to meet the original construction code. There are no provisions in ASME Section XI or in an approved Code Case for installing CFRP systems as a replacement for carbon steel piping during a

repair/replacement activity. Therefore, Dominion is submitting an ISI Alternative Request for NRC approval to use CFRP systems for the repair of the pipe sections detailed in Enclosure 2.

8. Proposed Alternative

Pursuant to 10 CFR 50.55a(z)(1), an alternative is proposed for the repair of the Surry Units 1 and 2 CW and SW carbon steel supply lines, detailed in Enclosure 2, that provides an acceptable level of quality and safety. Specifically, it is proposed that the CW and SW lines be repaired with a CFRP system produced by Structural Technologies, LLC. Design, installation, qualification, testing, and inspection details of the CFRP system are discussed in subsequent sections of this request, as well as Enclosures 2 through 9. The ISI inspection activities that will be implemented following implementation of the CFRP system are discussed below.

a) Inservice Inspection and Testing

i) For CFRP systems installed under this Alternative, inservice inspection activities will include system flow testing at least once each ISI Interval (for the remaining life of the plant) to verify adequate flow through the CW and major SW supply piping. This testing will be in accordance with Surry Power Station Units 1 and 2, System Pressure Test Plans, fifth ISI Interval, as well as Surry Power Station Unit 1, System Pressure Test Plans, sixth ISI Interval for the common unit piping. The testing will demonstrate and document performance of VT-2 examinations required by Surry's ISI program on the CW and SW systems' flow paths that support the safety functions of the RSHXs, CCHXs, Main Control Room/Relay Room chillers, and the Charging Pump SW System.

b) Additional SW System Inspections

i) Surry Power Station Units 1 and 2 Updated Final Safety Analysis Report (UFSAR), Section 18.2.17, *Service Water System Inspections*, notes the requirement for compliance with NRC Generic Letter 89-13, *Service Water System Problems Affecting Safety-Related Equipment,* July 18, 1989, and Supplement 1, dated April 4, 1990, which requires a variety of inspections, non-destructive examinations, and heat transfer testing for components cooled by SW.

ii) Surry SW System inspections are performed on a plant refueling outage frequency. The inspections check for biofouling, damaged coating, and degraded material condition. In addition, heat transfer parameters for components cooled by SW are monitored, and visual inspections are

performed to check for loss of material and changes in material properties. Heat transfer testing is also performed to identify the aging effects of loss of material and heat transfer degradation. The acceptance criteria for visual inspections are identified in the procedures that perform the individual inspections. The procedures identify the type and degree of anomalous conditions that are signs of degradation. In the case of SW, degradation includes biofouling, as well as material degradation. Engineering evaluations determine whether observed deterioration of material condition is sufficiently extensive to lead to loss of intended function for components exposed to the service water.

The information contained in brackets in Sections 8a through 8e and 9 below is requested to be withheld in its entirety in accordance with 10 CFR 2.390.

The information is requested to be withheld based on the following considerations:

- It reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by any of the submitter's competitors, without a license from the submitter, would constitute a competitive economic disadvantage to the submitter.
- Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
- The information requested to be withheld reveals commercial strategies of the submitter or customers or suppliers.
- It reveals aspects of privately funded development plans or programs of commercial value to the submitter or owner of the information.

8a) Material Manufacturing

8b) Design

8c) Installation, Examination & Testing

8d) Qualifications and Training

8e) Failure Mode Effects Analysis

9. Basis for Use

a) Additional enclosures are attached to this ISI Alternative and are listed below:

i) Enclosure 2 - Scope and Schedule Summary

ii) Enclosure 3 - Definitions and Acronyms

(1) Section 3A - Definition of Terms
(2) Section 3B - Acronyms

iii) Enclosure 4 - Material Manufacture and Qualification Testing

iv) Enclosure 5 - Design

v) Enclosure 6- Sample Installation and QA/QC Procedures

vi) Enclosure 7- Qualification and Training

vii) Enclosure 8- Failure Modes Effects Analysis (FMEA)

viii) Enclosure 9- Operational Experience

10. Duration of Proposed Alternative

The CFRP repair system alternative will be implemented in the Unit 1 fifth 10-year ISI interval that began on December 14, 2013 and ends on October 13, 2023, except for a common Unit 1 and Unit 2 SW line that will be completed during the Unit 1 sixth 10-year ISI interval. The CFRP alternative for Unit 2 will be implemented during the Unit 2 fifth ISI interval that began on May 10, 2014 and ends on May 9, 2024. The CFRP repair system alternative will remain in place for the life of the plant.

11. Precedents

The proposed alternative is a first-of-a-kind installation of a CFRP repair system in nuclear safety related piping; consequently, there are no citable industry precedents. However, Surry has implemented multiple projects involving CFRP repair systems with the same project team on approximately 600 linear feet (LF) of 30-inch, 42-inch, and 96-inch CW and SW carbon steel pipe with similar configurations. (See Enclosure 9, Attachment A for additional operating experience information). These projects were non-safety-related, enhanced quality projects performed in preparation for the proposed safety related projects.

12. References

a) ASME Section XI, "Rules for In-service Inspection of Nuclear Power Plant Components", 2004 Edition No Addenda

b) ANSI B31.1 -1967, "USAS Code for Pressure Piping"

c) NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment", July 18, 1989 (Supplement 1 dated April 4, 1990)

d) Surry Power Station Units 1 and 2 Updated Final Safety Analysis Report:

   i) Section 9.9 – Service Water System
   ii) Section 10.3.4 – Circulating Water System
   iii) Section 18.2.17 - Service Water System Inspections

ENCLOSURE 2

Draft Scope and Schedule Summary for Internal Repair of CW and SW Buried Piping using a CFRP System

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

DRAFT SCOPE AND SCHEDULE SUMMARY
INTERNAL REPAIR OF CW AND SW BURIED PIPING USING A CFRP SYSTEM

SURRY POWER STATION UNITS 1 AND 2

1. Surry Power Station (Surry) is submitting an alternative request for the use of a Carbon Fiber Reinforced Polymer (CFRP) system for the internal structural repair of selected safety related piping as described below:
    a. Surry Units 1 and 2 Circulating Water (CW) System 96" diameter inlet piping from the Station Intake Canal to the Main Condenser.
    b. Surry Units 1 and 2 Service Water System (SW) 24", 30", 36", 42" and 48" diameter pipe headers from the CW System to the supply lines of the Recirculation Spray Heat Exchangers and Component Cooling Heat Exchangers.
2. The piping is buried and encased in concrete. The concrete encasement was designed and installed as a Seismic Category 1 structure and provides the seismic support for these pipes.
3. Construction is anticipated to take place between spring 2018 and fall 2025.
4. A breakdown of the anticipated scope and construction schedule for the piping included in this alternative request is provided below.
5. It should be noted that, for the provided scopes, the lineal footage totals included in this proposed alternative are centerline measurements. The actual dimensions of repaired areas are slightly longer when development on corners, bends, and laterals are taken into account.

FLUID SYSTEM SAFETY CLASS INTERFACE BOUNDARY DEFINITIONS NOTES

SYPB - System Pressure Boundary

The function of mechanical components (e.g., valves, piping, pumps, tanks, accumulators, ducting, dampers, etc.) used to maintain system integrity and avoid system leakage.

Ensures nuclear safety functions provided by other safety systems or equipment. Included in this definition are portions of component and process cooling systems that cool other safety systems or equipment (e.g., Component Cooling Water System and Service Water System piping, heat exchangers and pumps).

STRU – Provide Structural Integrity

The function of the walls, ceilings, floor, the building in total, pipe supports, hangers, or other structures, that ensures an unimpaired operational status for associated or enclosed components.

Ensures nuclear safety functions provided by other safety systems or equipment. Included in this definition are portions of component and process cooling systems that cool other safety systems or equipment (e.g., Component Cooling Water System and Service Water System piping, heat exchangers and pumps)

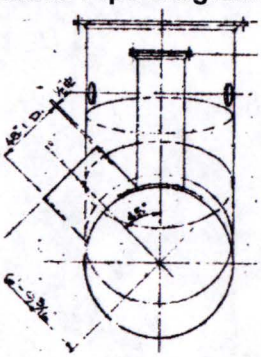
SR – Safety Related

Plant systems, portions of systems, structures and equipment whose failure could result in a release of radioactivity that could endanger public safety, or whose purpose is to mitigate the effect of such failure, or required for safe operation, shutdown, and removal of residual heat.

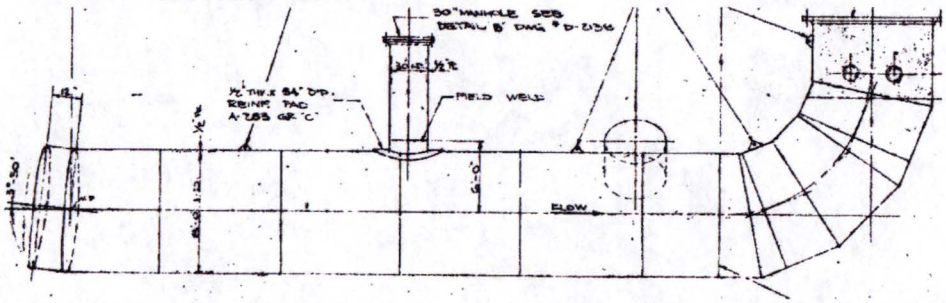
Unit 1- Spring 2018 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
Circulating Water (CW) Condenser Inlet "A"	SR SYPB STRU	96"-WC-1-10	96	66.00	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "A"	SR SYPB STRU	Manhole Riser (1-CW-FNG-1)	30	7.25	Includes tie-in detailing between manhole and 96in pipe.

Representative Pipe Diagrams:

End View:

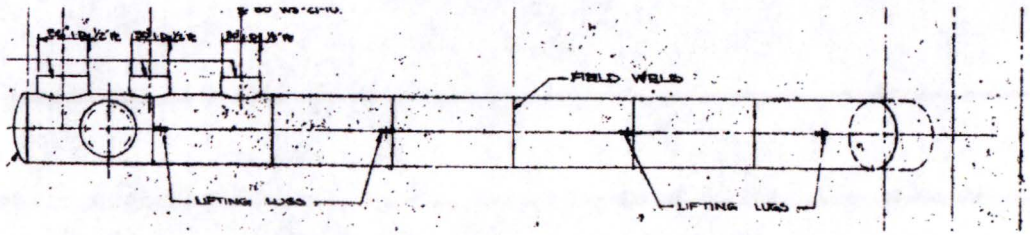


Elevation View:



Unit 1- Spring 2018 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
48-inch Service Water (SW) Supply Header from Condenser "A" Inlet Supplies Recirculating Spray (RS) and Bearing Cooling (BC) Systems	SR SYPB	48"-WS-1-10	48	53	Includes end cap and one 45 degree vertical bend.
36-inch SW Supply to BC Heat Exchangers from SW Supply Header (48"-WS-1-10)	SR SYPB	36"-WS-3-10 upstream of MOV 1-SW-MOV-101B	36	4	Includes tie-in detailing between one 36in. connection and the 48in. SW pipe.
30-inch SW Supply to RS Heat Exchangers from SW Supply Header (48"-WS-1-10)	SR SYPB	30"-WS-21-10 30"-WS-22-10 upstream of MOVs 1-SW-MOV-103C & 1-SW-MOV-103D	30	11	Includes tie-in detailing between two 30in. connections (each 4ft long) and the 48in. SW pipe.
30-inch Manhole Riser from SW Supply Header (48" SW-1-10)	SR SYPB	Manhole Riser (1-SW-FNG-1)	30	3	Includes tie-in detailing between manhole and 48in SW pipe

Plan view:

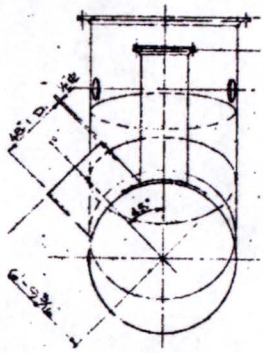


Elevation view:

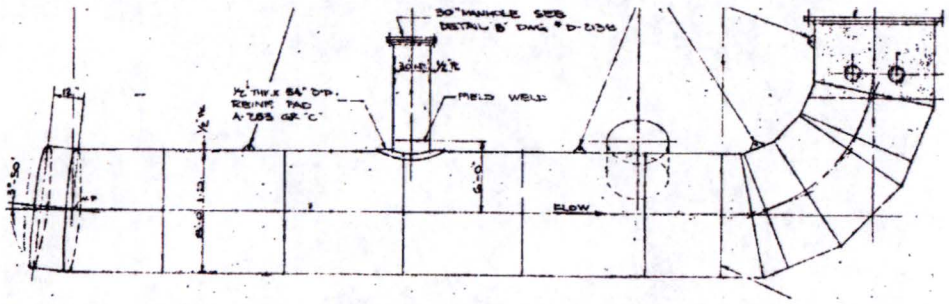
Unit 1- Fall 2019 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "D"	SR SYPB STRU	96"-WC-4-10	96	66.17	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "D"	SR SYPB STRU	Manhole Riser (1-CW-FNG-4)	30	7.25	Includes tie-in detailing between manhole and 96in pipe.

Representative Pipe Diagrams:

End View:



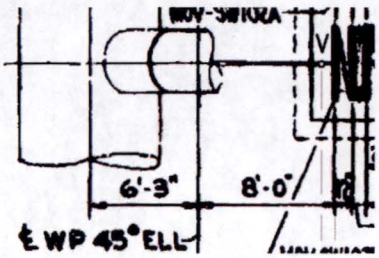
Elevation View:



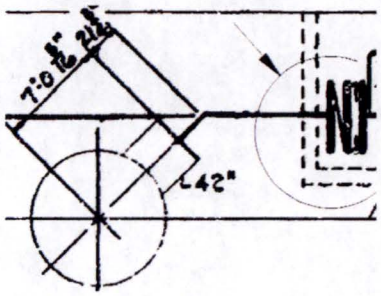
Unit 1 – Fall 2019 Outage, Continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional nos.**
42-inch SW Supply from Condenser "D" Inlet to Component Cooling (CC) Heat Exchangers	SR SYPB	42"-WS-12-10 upstream of MOV 1-SW-MOV-102B	42	13	Includes 45 degree vertical bend and tie-in detailing between 42in. pipe and 96in. pipe.

Representative Pipe Diagrams:

End View:



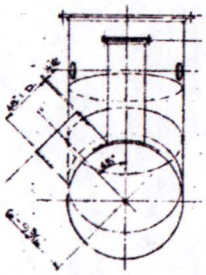
Elevation View:



Unit 1- Spring 2021 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "C"	SR SYPB STRU	96"-WC-3-10	96	66.17	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "D"	SR SYPB STRU	Manhole Riser (1-CW-FNG-3)	30	7.25	Includes tie-in detailing between manhole and 96in. pipe.

Representative Pipe Diagrams:

End View:



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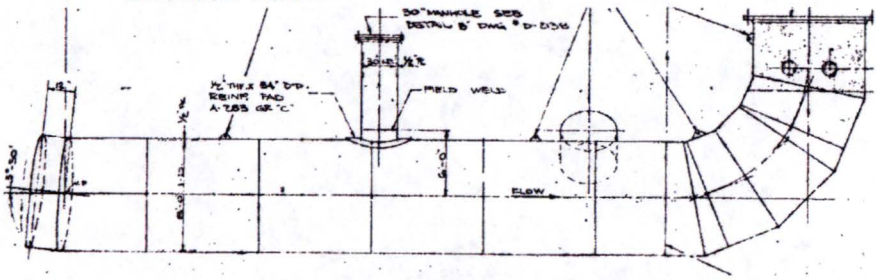
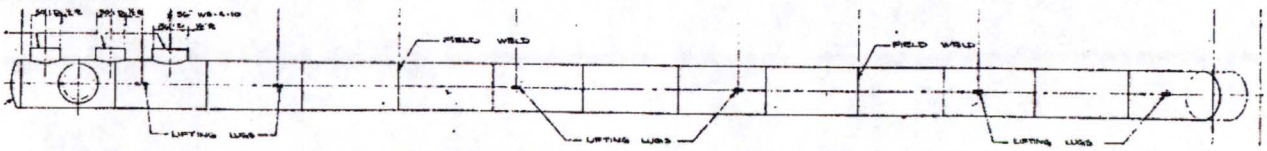


Unit 1- Spring 2021 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
48-inch SW Supply Header from Condenser "C" Inlet Supplies RS and BC Systems	SR SYPB	48"-WS-2-10	48	108.17	Includes end cap and one 45 degree vertical bend.
30-inch SW Supply to RS Heat Exchangers from SW Supply Header (48"-WS-2-10)	SR SYPB	30"-WS-23-10 30"-WS-24-10 upstream of MOVs 1-SW-MOV-103A & 1-SW-MOV-103B	30	20.00	Includes tie-in detailing between two 30in. connections (each 10ft long) and the 48in. pipe.
36-inch SW Supply to BC Heat Exchangers from SW Supply Header (48"-WS-2-10)	SR SYPB	36"-WS-4-10 upstream of MOV 1-SW-MOV-101A	36	10.00	Includes tie-in detailing between one 36in. connection (10ft long) and the 48in. pipe.
30-inch Manhole Riser from SW Supply Header (48" SW-2-10)	SR SYPB	Manhole Riser (1-SW-FNG-2)	30	3	Includes tie-in detailing between manhole and 48in SW pipe

Drawings for 48"-WS-2-10, 30"-WS-24-10, 30"-WS-23-10, 36"-WS-4-10 upstream of MOV

Plan View:



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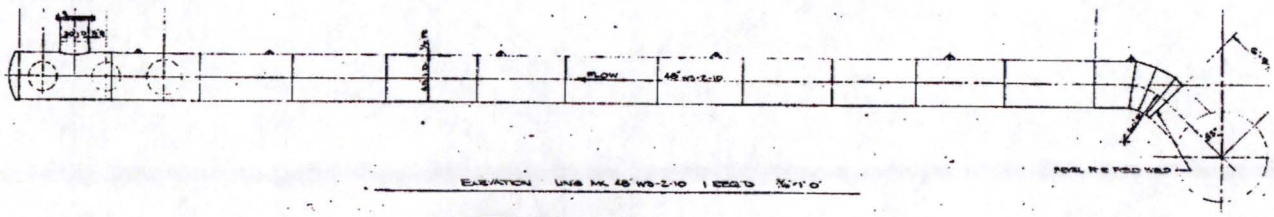
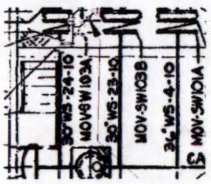


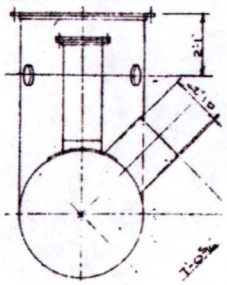
Schematic of connections:



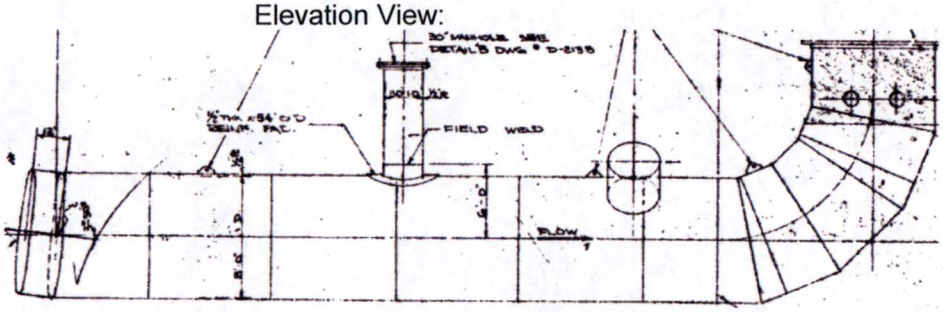
Unit 1- Fall 2022 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "B"	SR SYPB STRU	96"-WC-2-10	96	66.00	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "D"	SR SYPB STRU	Manhole Riser (1-CW-FNG-2)	30	7.25	Includes tie-in detailing between manhole and 96in. pipe.

Representative Pipe Diagrams:

End View:

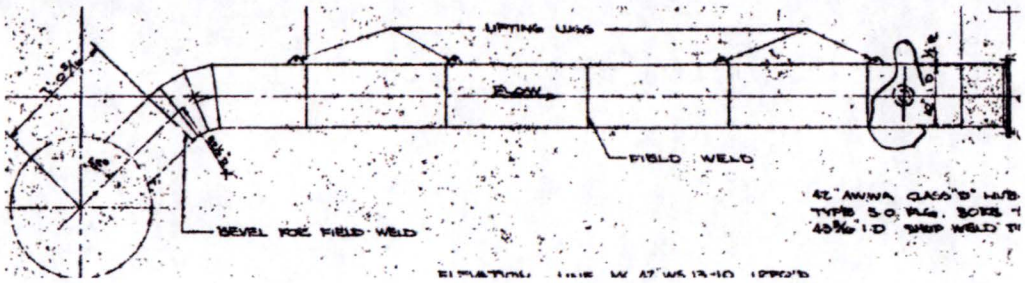


Elevation View:



Unit 1- Fall 2022 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
42-inch SW Supply from Condenser "B" Inlet to Component Cooling (CC) Heat Exchangers	SR SYPB	42"-WS-13-10 Upstream of MOV, 1-SW-MOV-102A	42	50.50	Includes one 45 degree vertical bend. Also includes detailing around one 1in. vent line near valve.

Representative Pipe Diagrams:

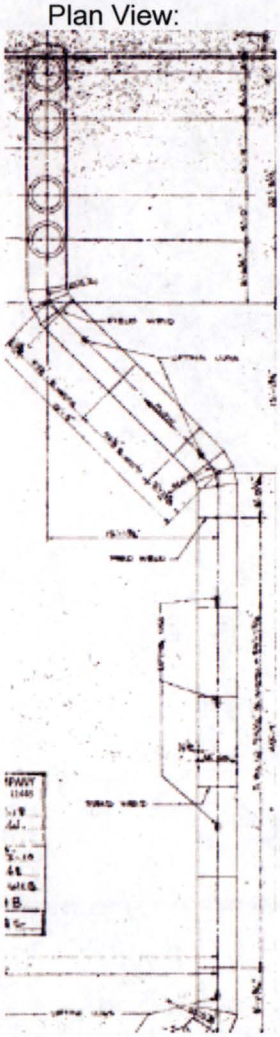


Unit 1- Fall 2025 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
42-inch SW Supply from MOV 1-SW-MOV-102A to CC Heat Exchangers	SR SYPB	42"-WS-13-10	42	186.92	Includes one end cap, four 45 degree horizontal bends, and one 45 degree horizontal "Y" in pipe. Also includes detailing around one 4in. connection. See capital city drawing of CCHX 11448-621-82 for further details.
Four 30-inch SW Supply vertical risers to CC Heat Exchangers	SR SYPB	30"-WS-15-10 30"-WS-40-10 30"-WS-14-10 30"-WS-16-10	30	20.33	Includes tie-in detailing between four 30in. connections (each approx 5ft long) and the 42in. pipe.
24-inch manhole riser on 42"-WS-13-10	SR SYPB	Manhole Riser (1-SW-FNG-13)	24	3.25	Includes tie-in detailing between one 24in. manhole (3ft tall) and the 42in. pipe.
42-inch line from 1-SW-MOV-102B to 42"-WS-13-10	SR SYPB	42"-WS-12-10 downstream of MOV	42	32.5	Includes tie-in detailing to 24in. manhole on one end and valve on other

Unit 1- Fall 2025 Outage, continued

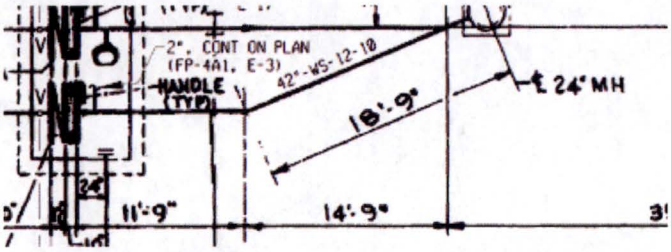
Drawings for Pipe Numbers "30-WS-13-10, 30"-WS-15-10, 30"-WS-40-10, 30"-WS-14-10, 30"-WS-16-10, Manhole riser attached to 42"-WS-13-10, and 42"-WS-12-10.

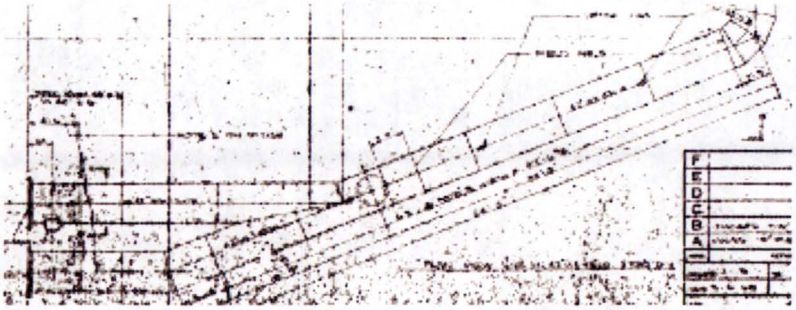
Plan View:



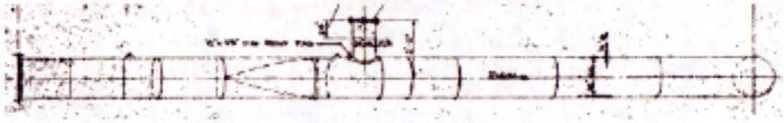
Elevation View:

Schematic of connections:





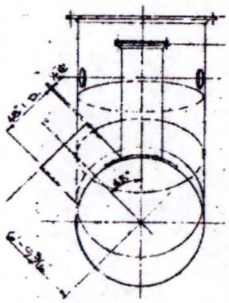
Elevation View:



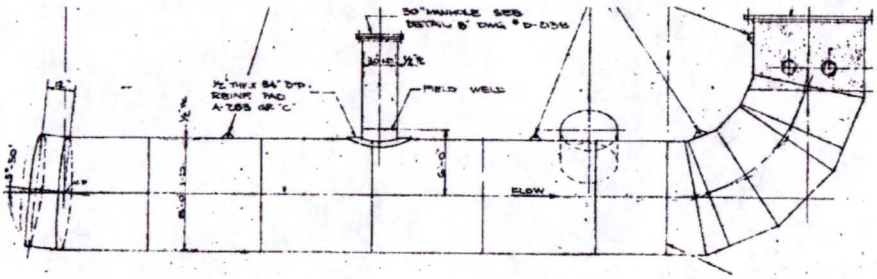
Unit 2 - Fall 2018 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "A"	SR SYPB STRU	96"-WC-101-10	96	58.83	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "A"	SR SYPB STRU	Manhole Riser (2-CW-FNG-101)	30	7.25	Includes tie-in detailing between manhole and 96in. pipe.

Representative Pipe Diagrams:

End View:



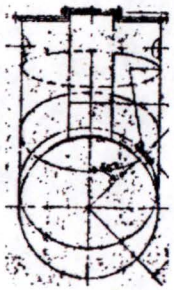
Elevation View:



Unit 2 - Fall 2018 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "D"	SR SYPB STRU	96"-WC-104-10	96	58.83	Includes one 90 degree vertical elbow. Surry to weld plates over four 4in. connections prior to STRUCTURAL installing CFRP. Also includes connecting to a 10in lateral (10"-WS-142-136)
Manhole Riser from Condenser Inlet "D"	SR SYPB STRU	Manhole Riser (2-CW-FNG-104)	30	7.25	Includes tie-in detailing between manhole and 96in. pipe.

Representative Pipe Diagrams:

End View:



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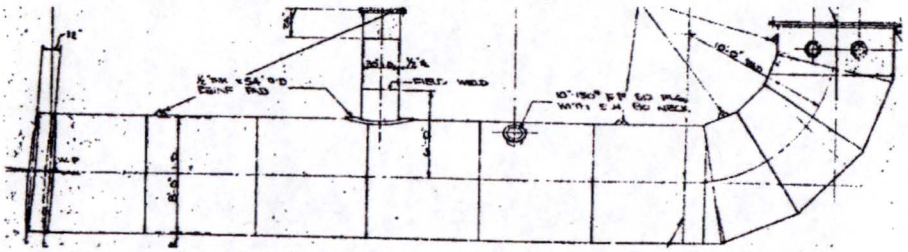
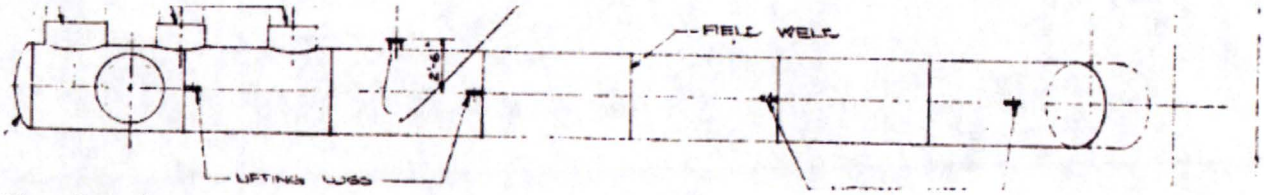
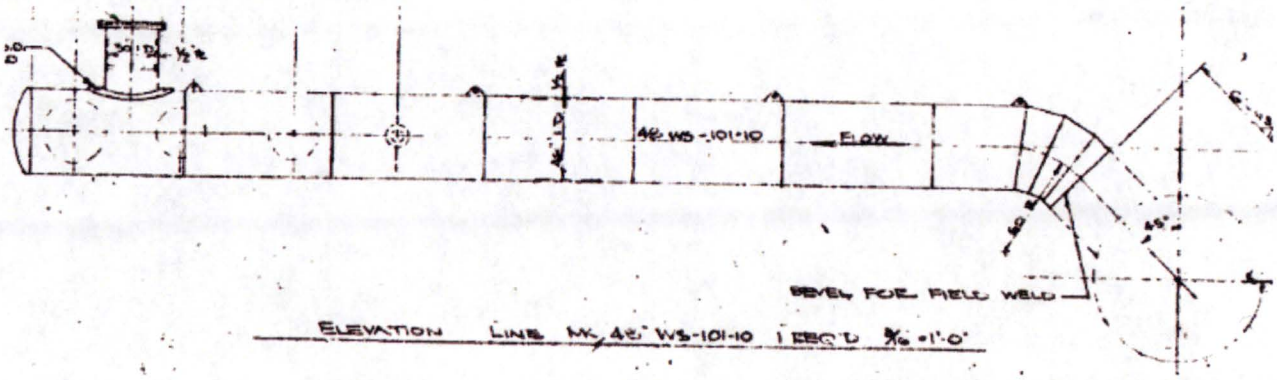


Unit 2 - Fall 2018 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
48-inch SW Supply Header from Condenser "A" Inlet Supplies RS and BC Systems	SR SYPB	48"-WS-101-10	48	53	Includes end cap and one 45 degree vertical bend.
36-inch SW Supply to BC Heat Exchangers from SW Supply Header (48"-WS-101-10)	SR SYPB	36"-WS-103-10 upstream of MOV	36	4	Includes tie-in detailing between one 36in connection and the 48in pipe.
30-inch SW Supply to RS Heat Exchangers from SW Supply Header (48"-WS-101-10)	SR SYPB	30"-WS-121-10 30"-WS-122-10	30	8	Includes tie-in detailing between two 30-inch connections (each 4ft long) and the 48in pipe.
30-inch Manhole Riser from SW Supply Header (48" SW-101-10)	SR SYPB	30" manhole	30	3	Includes tie-in detailing between one manhole (3ft tall) and the 48in pipe.

Plan view:



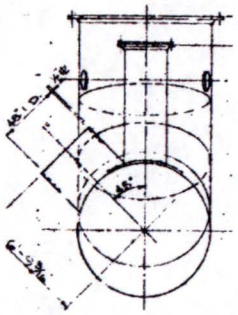
Elevation view:



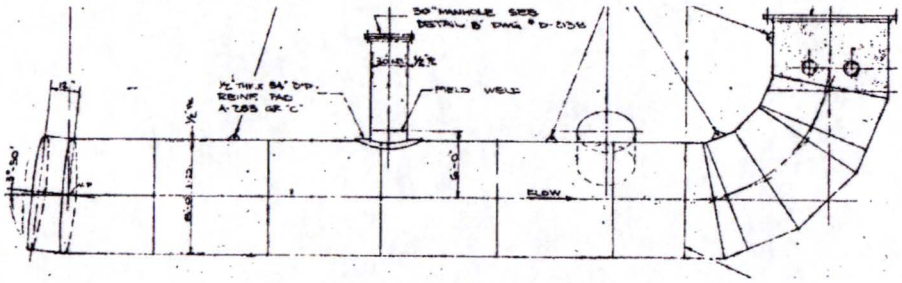
Unit 2 - Spring 2020 Outage					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "C"	SR SYPB STRU	96"-WC-103-10	96	58.83	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP.
Manhole Riser from Condenser Inlet "C"	SR SYPB STRU	Manhole Riser (2-CW-FNG-103)	30	7.25	Includes tie-in detailing between manhole and 96in. pipe.

Representative Pipe Diagrams:

End View:

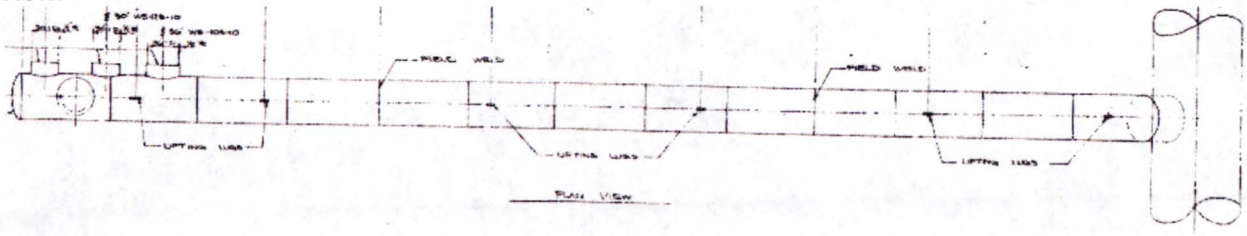


Elevation View:

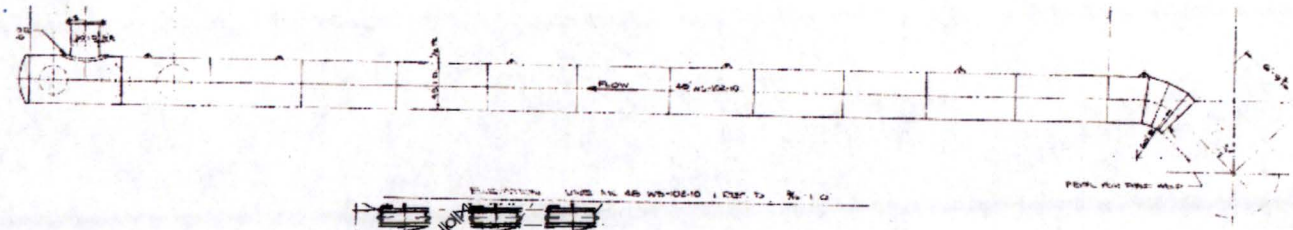


Unit 2 - Spring 2020 Outage, continued					
Pipe Service	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
48-inch SW Supply Header from Condenser "C" Inlet Supplies RS and BC Systems	SR SYPB	48"-WS-102-10	48	108.17	Includes end cap and one 45 degree vertical bend.
36-inch SW Supply to BC Heat Exchangers from SW Supply Header (48"-WS-102-10)	SR SYPB	30"-WS-124-10 30"-WS-123-10	30	20.00	Includes tie-in detailing between two 30-inch connections (each 10ft long) and the 48in pipe.
30-inch SW Supply to RS Heat Exchangers from SW Supply Header (48"-WS-102-10)	SR SYPB	36"-WS-104-10 upstream of MOV	36	10.00	Includes tie-in detailing between one 36-inch connections (10ft long) and the 48in pipe.
30-inch Manhole Riser from SW Supply Header (48" SW-102-10)	SR SYPB	30" manhole	30	3	Includes tie-in detailing between one manhole (3ft tall) and the 48in pipe.

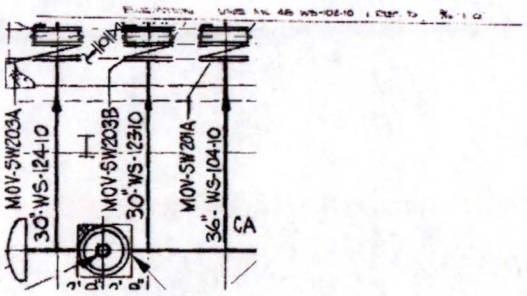
Plan View:



Elevation View:



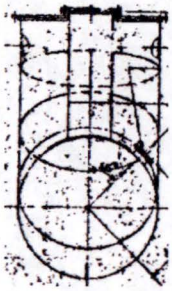
Schematic of connections:



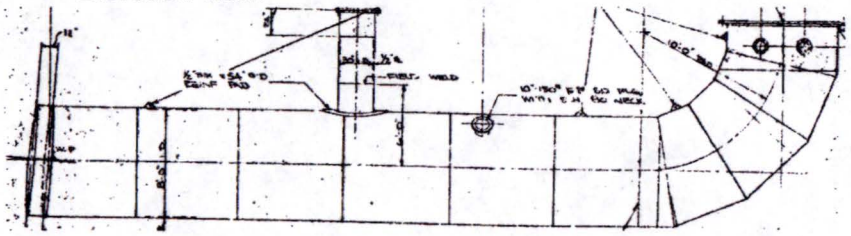
Unit 2 - Fall 2021 Outage					
Pipe Designation	**Safety Classification**	**Pipe Number(s)**	**Diameter (in.)**	**Pipe Length (ft.)**	**Additional notes**
CW Condenser Inlet "B"	SR SYPB STRU	96"-WC-102-10	96	58.83	Includes one 90 degree vertical elbow. Surry to weld plates over four abandoned 4in. connections prior to STRUCTURAL installing CFRP. Includes connecting to a 10in. lateral (10"-WS-143-136, 11548-FP-4A &4B)
Manhole Riser from Condenser Inlet "B"	SR SYPB STRU	Manhole Riser (2-CW-FNG-102)	30	7.25	Includes tie-in detailing between manhole and 96in pipe.

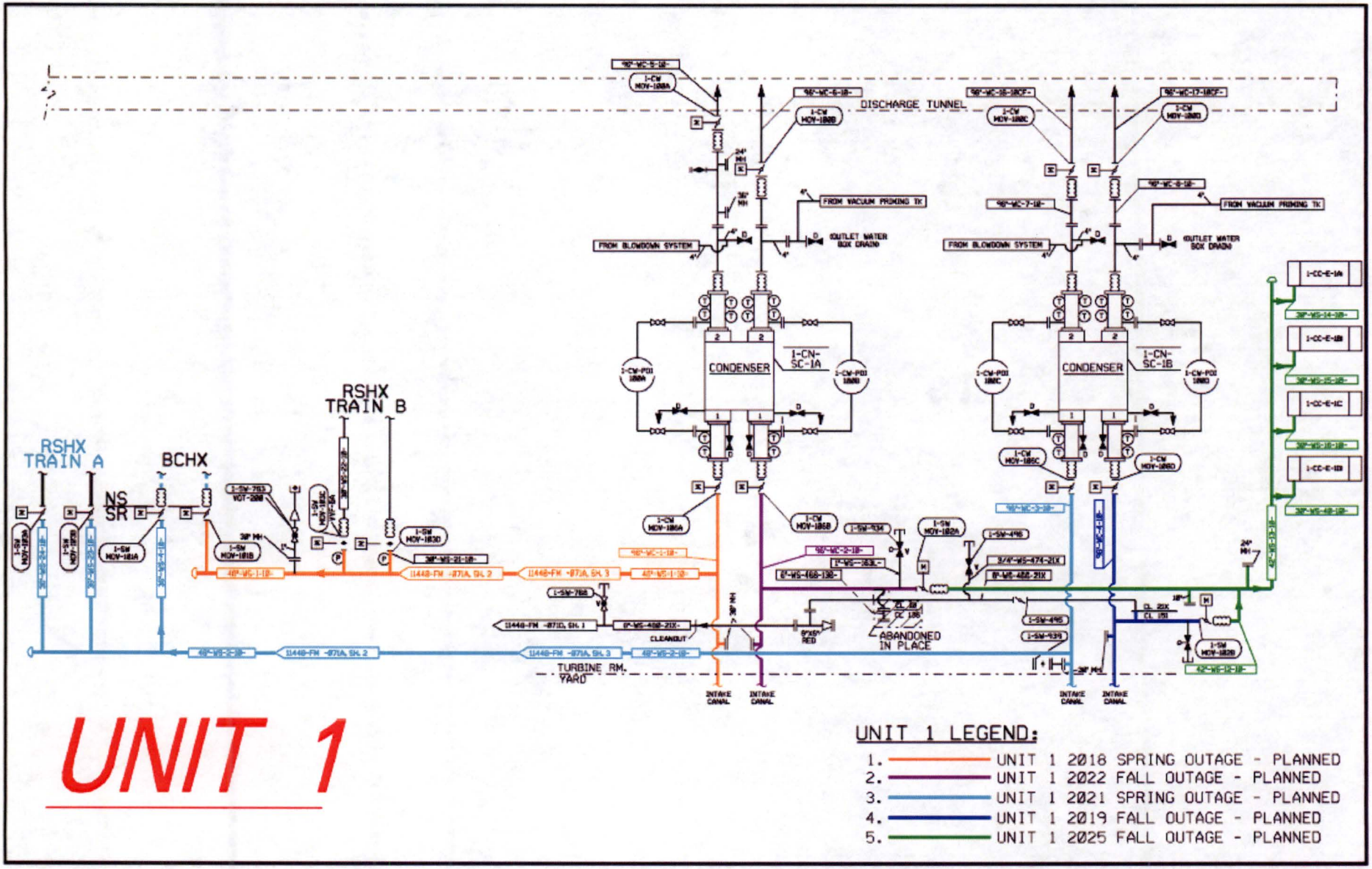
Representative Pipe Diagrams:

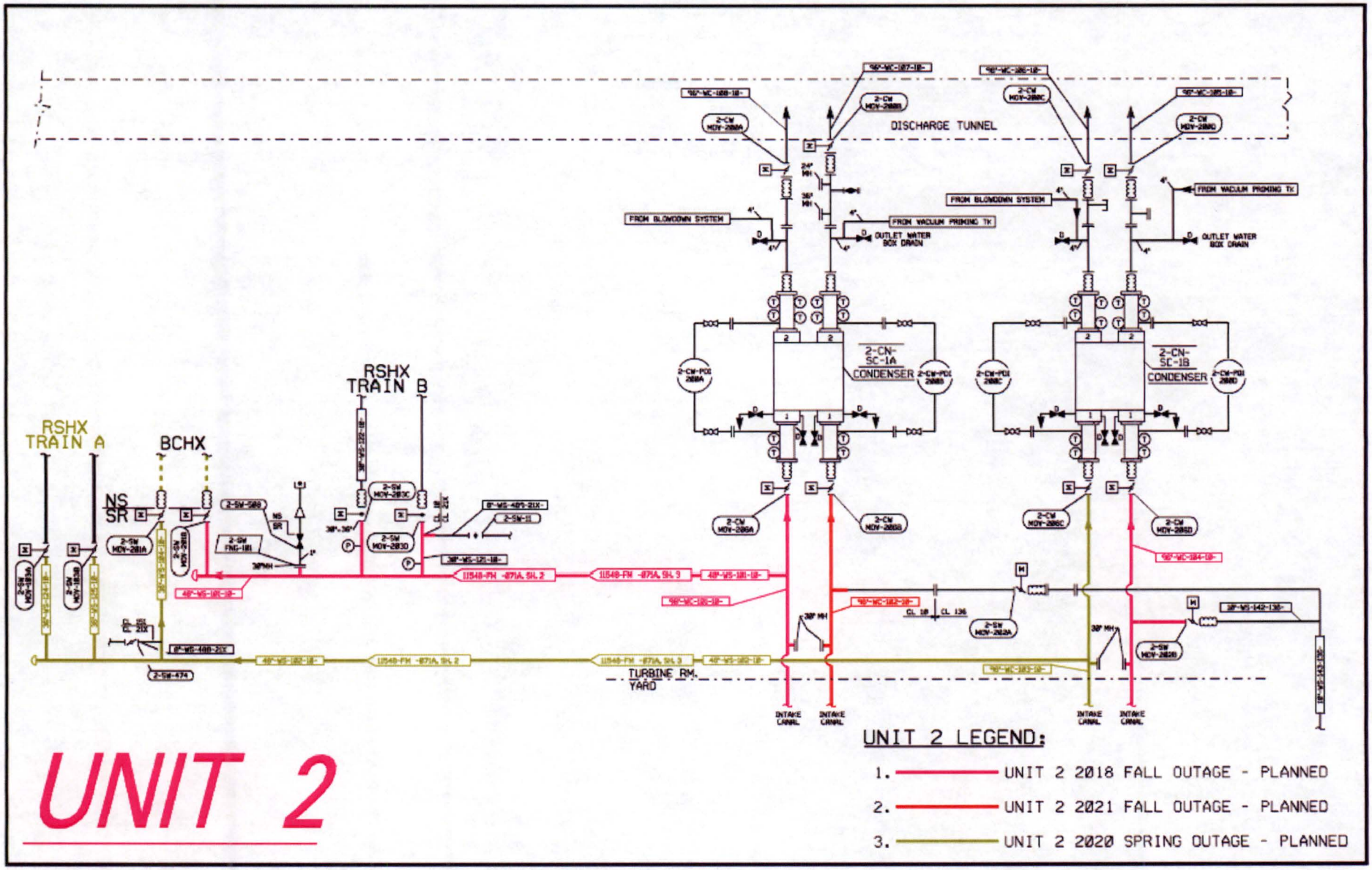
End View:



Elevation View:




DISCHARGE TUNNEL
FROM VACUUM PRIMING TK
FROM BLOWDOWN SYSTEM
OUTLET WATER BOX DRAIN
CONDENSER
1-CN-SC-1A
1-CN-SC-1B
RSHX TRAIN B
RSHX TRAIN A
BCHX
NS SR
CLEANOUT
ABANDONED IN PLACE
TURBINE RM. YARD
INTAKE CANAL
UNIT 1
UNIT 1 LEGEND:
1. UNIT 1 2018 SPRING OUTAGE - PLANNED
2. UNIT 1 2022 FALL OUTAGE - PLANNED
3. UNIT 1 2021 SPRING OUTAGE - PLANNED
4. UNIT 1 2019 FALL OUTAGE - PLANNED
5. UNIT 1 2025 FALL OUTAGE - PLANNED


DISCHARGE TUNNEL
FROM BLOWDOWN SYSTEM
FROM VACUUM PRIMING TK
OUTLET WATER BOX DRAIN
2-CN-SC-1A CONDENSER
2-CN-SC-1B CONDENSER
RSHX TRAIN A
BCHX
NS SR
RSHX TRAIN B
TURBINE RM. YARD
INTAKE CANAL
UNIT 2
UNIT 2 LEGEND:
1. UNIT 2 2018 FALL OUTAGE - PLANNED
2. UNIT 2 2021 FALL OUTAGE - PLANNED
3. UNIT 2 2020 SPRING OUTAGE - PLANNED

ENCLOSURE 3

Definition of Terms and Acronyms
Internal Repair of Buried Piping using a Carbon Fiber Reinforced Polymer System

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

Definition of Terms and Acronyms
Internal Repair of Buried Piping using a Carbon Fiber Reinforced Polymer System

Surry Power Station- Units 1 and 2

TABLE OF CONTENTS

SECTION 3A - DEFINITION OF TERMS
SECTION 3B - ACRONYMS

SECTION 3A - DEFINITION OF TERMS

Acceptance Test: A test or series of tests conducted to determine whether a material system or component conforms to the specified requirements.

Adhesive: A substance capable of holding materials together by surface attachment.

Amine Blush: Surface oiliness or "sweating" that occurs when epoxy is cured in a cool or high-humidity environment.

Batch: A quantity of material produced in a single manufacturing run. (Also see Lot)

Batch Number: An identification number assigned to a particular quantity of material from a single manufacturer. (Also see Lot Number)

Blister: Void between the layers of the Carbon Fiber Reinforced Polymer (CFRP) system that contains fluid.

Bond Length: The length at the repair terminations over which the CFRP system is designed to remain bonded to the host steel pipe to transfer longitudinal forces and maintain watertightness at the ends of the CFRP system.

Bond Strength: The direct pull-off bond strength between the CFRP system and steel substrate obtained in accordance with ASTM D4541.

Bubble: Void between the layers of the CFRP system that contains air.

Buckling: A limit state involving a sudden change in the geometry of the structure or structural elements thereof due to compressive forces exceeding stable equilibrium.

Carbon Fiber: A solid semi-crystalline organic material consisting on the atomic level of planar two-dimensional arrays of carbon atoms. Carbon fibers are used in CFRP renewal and strengthening in the form of unidirectional fabric.

CFRP System: The CFRP system is used to repair and strengthen pipe systems. The CFRP system is comprised of high strength carbon fiber fabrics and/or glass fiber fabrics, fully saturated in a two part 100% solids epoxy matrix. These laminates are bonded both longitudinally and circumferentially to the interior surface of the pipe forming a structural lining within the pipe. This lining can be designed to replace the degraded portions of the existing system without reliance on the degraded piping for the life of the repair, except at the terminal ends of the repair. CFRP system can include the following components: V-Wrap™ C400H and/or V-Wrap™ C400HM, V-Wrap™ EG50-B, V-Wrap™ 770, Cabo-Sil-TS 720, and the components associated with the expansion rings (elastomeric rubber, stainless steel expansion rings (weko-type seals)).

Characteristic Value: Statistically based property value representing the 80% lower confidence bound on the 5th-percentile value of a specified population, determined in accordance with Test Method ASTM D7290.

Characteristic Strength: Characteristic value of strength calculated according to ASTM D7290 using short-term laboratory test data.

Characteristic Modulus: Characteristic value of modulus of elasticity calculated according to ASTM D7290 using short-term laboratory test data.

Characteristic Ultimate Strain: Characteristic strength divided by the Weibull mean modulus.

Circumferential Direction: Circumferential direction of the host pipe.

Components Being Restrained: Components that are not functionally safety related, but that are required to be seismically restrained, supported or anchored to prevent damage to nearby safety related equipment.

Compressive Failure: Failure by reaching compressive strength without buckling.

Constructor: The party that provides the work and materials for placement or installation.

Crazing: Micro-Cracking.

Creep: Time-dependent deformation under constant load.

Creep Rupture: Failure under a sustained load that is lower than the short-term strength.

Debonding: Separation between the CFRP system and the steel substrate.

Delamination: Inter-Ply separation.

Demand: Strain or stress created in the structure by the design loads.

Design Authority: Has developed processes and procedures that allow for the complete and accurate transfer of the high level design information and performance requirements specified in the Updated Final Safety Analysis Report (UFSAR) into detailed procedures, specifications, calculations, drawings, procurement, and/or construction documents, in a manner consistent with the requirements of Appendix B to 10 CFR Part 50.

Design Strength: Nominal resistance in end-use condition, *Rn,* multiplied by resistance factor, φ, and time effect factor, λ.

Design Ultimate Strain: Characteristic ultimate strain reduced by applicable resistance factor, time effect factor, and material adjustment factor.

Dry Lay-Up: The process of saturation of reinforcing fabric with epoxy after the fabric has already been placed onto the host structure. The dry lay-up method is not permitted.

Durability: The ability to resist weathering action, chemical attack, abrasion, and other conditions of service.

Edge lift: A gap located at the edge of the fabric.

Effective Factor of Safety: Ratio of the controlling load factor divided by the product of the resistance factor, time effect factor and material adjustment factor (Required Effective Factor of Safety); or product of the Required Effective Factor of Safety and the controlling strength/demand ratio (Actual Effective Factor of Safety), used in Load Resistance Factor Design (LRFD)-based design approach.

End-Use Conditions: The chemical and load exposure conditions to which the structure is subjected to during its service.

Engineer of Record: The licensed professional who is responsible for sealing the design documents related to CFRP renewal and strengthening.

Epoxy: The polymeric material used to bind together the reinforcing fibers in CFRP.

Factor of Safety: Ratio of the short-term strength and allowable stress (Required Factor of Safety), or ratio of short-term strength to unfactored demand (Actual Factor of Safety), used in ASD-based design approach.

Factored Load: Product of design load and a load factor.

Factored Strain or Factored Stress: Strain or stress created in the structure by the design loads, multiplied by the applicable load factors.

Fatigue: A progressive development of damage, such as cracking, fretting and similar effects, resulting from repeated application of loads.

Fiber Orientation: The orientation or alignment of the longitudinal axis of the fiber with respect to a stated reference axis.

Fillers: Substance added in the matrix or adhesive material to alter its engineering properties, performance, and/or cost.

Finish Layer: Provides an abrasion barrier and protection against chemicals, flow, debris, etc. Is typically a thickened epoxy, either with or without a pigment added to facilitate inspection. Is compatible with appropriate exposure conditions including moisture, salt water, elevated temperature, abrasion, and chemical exposure.

Glass transition temperature (T_g): Midpoint of the temperature range at which the polymer matrix changes from a glassy to a rubbery state.

Gravity Load: Vertical loads, including earth load, pipe and fluid weights, surcharge, and surface live loads.

Hold points: Steps within the installation procedure which requires inspector approval prior to proceeding.

Intermediate Layer: Limited layers of glass fiber may be used to provide filler for improving the through-wall moment of inertia of the carbon fiber laminate. The innermost layer shall be carbon fiber.

Lamina: A layer of reinforcing fabric and epoxy.

Laminate Architecture: Construction of the laminate from laminae with different types and orientations of unidirectional carbon fiber fabrics and unidirectional and woven glass fabrics.

Limit State: A condition in which a structure or component thereof is judged either to be no longer useful for its intended function (serviceability limit state) or to have reached its ultimate load-carrying capacity (strength or stability limit states).

Load Combination: Combination of the effects of design loads based on the likelihood of their simultaneous occurrence and uncertainty in each load.

Load Duration (time effect): The period of continuous application of a load, or the cumulative period of intermittent applications of a load.

Load Factor: A factor that accounts for unavoidable deviations of the actual load from the nominal load and for uncertainties in the analysis that transforms the load into a load effect.

Load and Resistance Factor Design (LRFD): A method of proportioning structural components (members, connectors, connecting elements, and assemblages) such that the design strength equals or exceeds the required strength for all applicable limit states.

Longitudinal Direction: Longitudinal direction of the host pipe.

Lot: A quantity of material produced in a single manufacturing run. (Also see Batch)

Lot Number: An identification number assigned to a particular quantity of material from a single manufacturer. (Also see Batch Number).

Long-Term Strength: Strength of CFRP under sustained load with duration equal to the service life of the structure.

Manufacturer: The party that manufactures, fabricates, produces, or supplies materials or products.

Material Adjustment Factor: Factors that define the resistance in the end use condition in terms of laboratory strength values.

Material Organization: Material manufacturer or material suppliers of CFRP repair system components.

Matrix: The continuous constituent of a CFRP system that surrounds the fibers. It consists of 100 percent solids, VOC compliant, epoxy with fillers and additives.

Misalignment: General or local deviation in the orientation of CFRP or GFRP layers from their design orientation.

Nominal Loads: The loads and load combinations specified for the design.

Nominal Strength or Nominal Resistance: The strength of a structure or component in the end-use conditions (without resistance factor or time-effect factors applied).

Non-Safety Related with Special Quality/Regulatory Requirements: Components in mechanical, electrical and instrumentation and control systems that are **not** safety related, but that have specific QA or regulatory requirements. These components are referred to as components with special regulatory significance. Included are those components that are required to resist failure, to assure the required performance of the safety systems is **not** impaired or that could initiate a need for safety system actuation.

Non-Structural Layers: Dielectric Barrier is used to avoid galvanic corrosion of steel in proximity to carbon fibers. A dielectric barrier layer shall be used for isolation of the steel from the CFRP laminate. Dielectric barrier includes a layer of glass fiber, saturating epoxy and thickened epoxy. All materials shall be compatible with the epoxy used to saturate the carbon fibers.

Ovality: Deviation of the host pipe geometry from the original circular shape, calculated as the pipe deflection divided by the original diameter.

Overlap separation: Unacceptable separation between fabric sheets; typically resulting from insufficient overlap.

Overlap Length: The design shall provide a minimum overlap in the direction of the fibers of 12 in., but not less than the manufacturers recommended development length as established through testing in accordance with ASTM D7616.

Performance Standard: Stipulated minimum performance threshold(s), requirement(s), or expectation(s) that must be met by a manufactured structure to be appraised at a particular level of performance. It can be based on tests that approximate the end-use conditions.

Pot Life: Time interval, after mixing of epoxy, during which the mixture can be applied without degrading the performance of the resulting CFRP system beyond specified limits.

Pre-Cured Laminates: Composite materials in which the reinforcing fabric has been saturated with epoxy and cured off-site. The use of pre-cured laminates is not permitted.

Primers: Are mixed according to the recommended procedure. Primer has sufficiently low viscosity and surface tension to thoroughly wet and coat the pipe surface and provide sufficient adhesion to accommodate design loads between the host pipe and the thickened epoxy or saturating epoxy.

Purchaser: The person, company, or organization that purchases any materials or work to be performed.

Reference Strength: Strength calculated based on the characteristic material properties obtained from short-term laboratory tests.

Relaxation: Time-dependent reduction in stress under a constant strain.

Reliability: Probability that a system will perform its intended function for a specific period of time under a given set of conditions.

Reliability Index: A parameter in reliability analysis that is correlated to probability of failure.

Required Strength: The load effect or structural action (force, moment, or stress) acting on a structural system, member, or connection, as determined by structural analysis from the factored loads, considered in appropriate combinations.

Resistance: Generic term describing the capacity of a structure, component, or connection to withstand the effects of load; determined from specified material strengths, stiffness, dimensions, and formulas derived from accepted principles of structural mechanics or by field or from laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.

Resistance Factor: A factor that accounts for unavoidable deviations and variability of the actual strength from the nominal end-use value and for the manner and consequences of failure.

Restraining Components (e.g., Pipe supports): Components that are not functionally safety related, but that are required to be seismically restrained, supported or anchored to prevent damage to nearby safety related equipment.

Roving: Large number of continuous parallel filaments or a group of untwisted parallel strands.

Rupture: Failure in tension through breakage of fibers.

Safety Related: Plant systems, portions of systems, structures and equipment whose failure could result in a release of radioactivity that could endanger public safety, or whose purpose is to mitigate the effect of such failure, or required for safe operation, shutdown, and removal of residual heat

Shear Bond Strength: Strength of the bond in shear between the CFRP system and the host steel pipe as determined by laboratory testing according to ASTM D7616.

Shear Bond Failure: Shear failure of the bond between CFRP system and steel substrate at the repair terminations.

Short-Term Strength: Strength of CFRP laminate under loads applied at the loading rate equal to that specified by the relevant ASTM Standard.

Stability Limit State: A limit state at which a slight disturbance in the loads or geometry of a structure in state of equilibrium produces large departures from the equilibrium state.

Strength Limit State: A limiting state at which failure, e.g., laminate rupture, occurs in a structure, component, or connection, compromising safety and ability to carry load.

Stress Range: Magnitude of change in stress due to the repeated application and removal of service loads, used in checking susceptibility to fatigue.

System Pressure Boundary: The function of mechanical components (e.g., valves, piping, pumps, tanks, accumulators, ducting, dampers, etc.) used to maintain system

integrity and avoid system leakage. Ensures nuclear safety functions provided by other safety systems or equipment. Included in this definition are portions of component and process cooling systems that cool other safety systems or equipment (e.g., Component Cooling Water System and Service Water System piping, heat exchangers and pumps).

Tack-free: The attainment of a sufficiently robust state to resist damage by contact or handling.

Termination Materials: May be used in the installation to provide an active pressure on the installed CFRP to prevent water intrusion between the CFRP and host pipe. The materials include single and multiple band corrosion resistant metal expansion rings with rubber gaskets.

Thickening Agents: Are mixed with the epoxy according to the recommended procedure to form a thickened epoxy. Thickened epoxy can be used as a primer or over a primer to provide a smooth surface for the application of the CFRP laminate.

Time-Effect Factor: The ratio of the creep rupture strength of laminate subjected to sustained load to the strength under short-term loading.

Toughness: Toughness (area under stress-strain curve or moment rotation curve) is the ability to absorb energy and can be quantified by computing the work done per unit mass of material.

Tow: Twisted bundle of continuous carbon fibers.

Unfactored Strain or Unfactored Stress: Strain or stress created in the structure by the nominal design loads.

Watertightness Layer: A layer of bidirectional glass fiber reinforced polymer embedded in the CFRP repair system.

Waviness: Deviation from the best-fit oval shape of the host pipe or the CFRP repair system, measured as the radial offset on the substrate.

Weibull Distribution: A probability distribution function used in evaluation of strength and life data.

Wet Lay-Up: The process of on-site saturation of the reinforcement fabric with epoxy followed by application of the saturated fabric to the host structure to cure in-place.

Wet surface: A surface that depicts visible moisture on a tissue that is held to the surface of the pipe for a minimum of 30 seconds.

Wrinkle: Localized misalignment and raised surface of the primary fiber direction.

SECTION 3B - ACRONYMS

ANSI: American National Standards Institute

AS: Aerospace Standards

ASD: Allowable Stress Design

ASME: American Society of Mechanical Engineers

ASTM: American Society of Testing and Materials

AWWA: American Water Works Association

BPV: Boiler and Pressure Vessel

BWR: Boiling Water Reactor

CAR: Corrective Action Request/Report

CBT: Computer Based Training

CFR: Code of Federal Regulations

CFRP: Carbon Fiber Reinforced Polymer

CLC1, CLC2, CLC3, CLC4: Circumferential Load Combinations

CoC: Certification of Conformance/Compliance

CPS: Centipoise

CMTR: Certified Material Test Report

CW: Circulating Water

DSC: Differential Scanning Calorimetry

DSR: Demand Strength Ratio

EPDM: Ethylene Propylene Diene Terpolymer

°F: Degrees Fahrenheit

FFD: Fitness for Duty

FRP: Fiber Reinforced Polymer

FEA: Finite Element Analysis

FME: Foreign Material Exclusion

FMEA: Failure Mode and Effects Analysis

FRP: Fiber Reinforced Polymer

ft: Feet

GFRP: Glass Fiber Reinforced Polymer

IAS: International Accreditation Service

in: Inches

ISI: Inservice Inspection

ISO: International Organization for Standardization

JHA: Job Hazard Analysis

KSI: Kips per Square Inch

LLC: Limited Liability Corporation

LLC1, LLC2, LLC3, LLC4: Longitudinal Load Combinations

LRFD: Load and Resistance Factor Design

LS: Limit State

NACE: National Association of Corrosion Engineers

NCR: Non-Conformance Report

NDE: Non-Destructive Examination

NEI: Nuclear Energy Institute

NIST: (USA) National Institute of Standards Technology

NRC: Nuclear Regulatory Commission

NQA: Nuclear Quality Assurance

NSF: National Science Foundation

NSQ: Non-Safety Related with Special Regulatory Significance

OE: Operating Experience

OSHA: Occupational Safety and Health Administration

oz: Ounces

PCCP: Prestressed Concrete Cylinder Pipe

PFD: Process Flow Diagram

PQP: Project Quality Plan

PWR: Pressurized Water Reactor

PSI: Pounds per square inch

QA/QC: Quality Assurance/Quality Control

QAP: Quality Assurance Program

RCA: Radiologically Controlled Area

REST: Components being restrained

RH: Relative Humidity

SCWE: Safety Conscious Work Environment

SDR: Strength Demand Ratio

SGH: Simpson Gumpertz & Heger

SOP: Standard Operating Procedure

SR: Safety Related

SS: Stainless Steel

STRU: Provide Structural Integrity

SW: Service Water

SIF: Stress Intensification Factor

SSPC: Society for Protective Coatings

SYPB: System Pressure Boundary

U: Unit

UA: Unescorted Access

UT: Ultrasonic Testing

UFSAR: Updated Final Safety Analysis

USAS: United States of America Standards

WRF: Water Research Foundation

yd: Yard

ENCLOSURE 10

Applications for Withholding Proprietary Information from Public Disclosure

- **Structural Group, "Application for Withholding Proprietary Information From Public Disclosure," dated November 23, 2016**

- **Simpson Gumpertz & Heger, "Application for Withholding Proprietary Information From Public Disclosure," dated November 30, 2016**

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

structural
group

November 23, 2016

U. S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Application for Withholding Proprietary Information from Public Disclosure

Reference: 1. Structural Group, Inc. Letter of Transmittal and attachments, titled *"Letter of Transmittal – Structural Group, Inc. Input for Dominion Request for Use of Alternative"*, dated November 23, 2016

2. Dominion Letter To Nuclear Regulatory Commission, *Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1),* Docket Nos. 50-280/281, Serial No. 16-448

3. 10 CFR 2.390, *Public Inspections, Exemptions, Requests for Withholding*

Ladies and Gentlemen:

Structural Group, Inc., has provided certain proprietary information to Dominion Resources, Inc. (Dominion) or a Dominion affiliate in connection with a request by Dominion for authorization from the U. S. Nuclear Regulatory Commission (NRC) to use an alternative to the requirements of 10 CFR 50.55a(z)(1). This application requests that proprietary information of Structural Group, Inc. be protected from public disclosure.

The proprietary information for which withholding is being requested in Reference 1 is further identified in the attached affidavit signed by the owner of the proprietary information, Structural Group, Inc. (SGI), on behalf of itself and any wholly-owned subsidiaries or affiliated companies. An affidavit accompanies this letter, setting forth the basis on which the information may be withheld from public disclosure by the NRC and addressing with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the NRC's regulations.

Accordingly this letter authorizes the utilization of the accompanying Affidavit by Dominion.

Correspondence with respect to the proprietary aspects of the Application or the Affidavit should reference this letter and be addressed to Scott Greenhaus, Executive Vice President, Structural Group, Inc., 10150 Old Columbia Road, Columbia, MD 21046.

Very truly yours,

Scott Greenhaus
Executive Vice President
O (410) 859-6458 M (410) 340-3205
sgreenhaus@structuralgroup.com

structural group

AFFIDAVIT

State of Maryland)
)
)
County of Howard)

Before me, the undersigned authority, personally appeared Scott Greenhaus, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Structural Group, Inc. and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief.

Scott Greenhaus
Executive Vice President

Sworn to and subscribed before me this 23 day of November 2016

Notary Public

ELOISE C. BROWN
NOTARY PUBLIC
ANNE ARUNDEL COUNTY
MARYLAND
MY COMMISSION EXPIRES JUNE 9, 2020

ELOISE C. BROWN NOTARY PUBLIC ANNE ARUNDEL COUNTY, MD

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I, Scott Greenhaus, am Executive Vice President of Structural Group, Inc. ("SGI"). In my capacity as Executive Vice President I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in conjunction with nuclear plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of SGI and its affiliates.

I am making this Affidavit in conformance with the provisions of 10 CFR 2.390 of the U. S. Nuclear Regulatory Commission (NRC) regulations and in conjunction with SGI's Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

I have personal knowledge of the criteria and procedures utilized by SGI in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of 10 CFR 2.390 of the NRC's regulations, the following is furnished for consideration by the NRC in determining whether the information sought to be withheld from public disclosure should be withheld.

The information sought to be withheld from public disclosure is owned by and has been held in confidence by SGI. Specific portions of the Dominion request which include SGI proprietary information are:

1) Enclosure 1 - Proposed Alternative to ASME Section XI Requirements
   a) Sub-Sections 8a) through 8e)
   b) Sub-Sections 9 (a) (iii) through 9 (a) (viii)

2) Enclosure 4 - Material Manufacture and Qualification Testing (withheld in its entirety)

3) Enclosure 6 - Installation and QA/QC Procedures (withheld in its entirety)

4) Enclosure 7- Qualification and Training (withheld in its entirety)

5) Enclosure 8 - Failure Modes Effects Analysis (FMEA) (withheld in its entirety)

6) Enclosure 9 - Operational Experience (withheld in its entirety)

The information is of a type customarily held in confidence by SGI and not disclosed to the public. SGI has a rational basis for determining the types of information customarily held in confidence by it and utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system provides a rational basis for maintaining confidentiality and justifies the NRC withholding the information from public disclosure.

Under SGI's system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

1) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by a competitor of SGI without license constitutes a competitive advantage over other companies.

2) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

3) Its use by a competitor would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

4) It reveals cost or price information, production capacities, budget levels, or commercial strategies of SGI, their customers or suppliers.

5) It reveals aspects of past, present, or future development plans funded by a SGI or its customer, and programs of potential commercial value to SGI.

6) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the SGI system which include the following;

1) The use of such information by SGI gives it a competitive advantage over competitors. It is, therefore, withheld from disclosure to protect SGI's competitive position.

2) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes SGI's ability to sell products and services involving the use of the information.

3) Use by a competitor would put SGI at a competitive disadvantage by reducing the competitor's expenditure of resources and capital.

4) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire process, thereby depriving SGI of its competitive advantage.

5) Unrestricted disclosure would jeopardize the position of prominence of SGI in the world marketplace, and thereby give a market advantage to competitor in those countries in which SGI operates.

6) SGI's capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

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The information is being transmitted to the NRC in confidence and, under the provisions of 10 CFR 2.390, it is to be received in confidence by the NRC. The information sought to be protected is not available in public sources and, to the best of our knowledge and belief, available information has not been previously employed in the same original manner or method.

The proprietary information sought to be withheld in this submittal is that which is appropriately marked in Dominion Letter to the NRC, *Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1),* Docket Nos. 50-280/281, Serial No. 16-448, being transmitted by Dominion letter and reflected in SGI's Application for Withholding Proprietary Information from Public Disclosure dated November 23, 2016, addressed to the NRC Document Control Desk. The proprietary information as submitted by SGI is that associated with the *Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1)* for Surry Units 1 and 2, and may be used only for that purpose.

This information is part of that which will enable SGI to:

1) Provide input to Dominion to provide to the NRC for review of the Surry Unit 1 and 2, 10 CFR 50.46 submittal; and

2) Provide licensing support for the Dominion submittal.

SGI owns or is permitted to use the proprietary information referenced in this Affidavit under agreements that include SGI's maintaining the confidentiality of such information, as contemplated in this Affidavit.

Further this information has substantial commercial value as follows;

1) The SGI plan to sell the use of this information to their customers for the purpose of installing Carbon Fiber Reinforced Polymer (CFRP) in safety related piping.

2) That SGI can sell support and defense of the technology to their customers in the licensing process.

3) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by SGI.

4) Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of SGI because it would enhance the ability of competitors to provide similar licensing services for commercial power reactors without commensurate expenses.

5) Public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

6) The development of the technology described in part by the proprietary information is the result of applying the results of many years of experience in an intensive effort by SGI and the expenditure of a considerable sum of money and resources. In order for competitors to duplicate this information, similar technical programs would have to be performed including a significant expenditure money and resources.

Further the deponent sayeth not.

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PROPRIETARY INFORMATION NOTICE

Transmitted herewith are the proprietary and non-proprietary versions of documents furnished to the NRC.

In order to conform to the requirements of 10 CFR 2.390 of the NRC regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions has been deleted in the non-proprietary versions. The justification for claiming the information so designated as proprietary is indicated in the non-proprietary versions.

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SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

161295-SGH-L-001

30 November 2016

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Withholding of Certain Proprietary Information Pursuant to 10 CFR 2.390

Reference: (1) Letter from Virginia Electric and Power Company to US NRC, "Proposed Alternative to ASME Section XI Requirements for Repair/Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1)," Docket Nos. 50-280 and 50-281, Serial No. 16-448.

(2) Letter from Structural Group, Inc. to NRC, "Application for Withholding Proprietary Information from Public Disclosure," dated November 23, 2016.

In Reference (1), Virginia Electric and Power Company (VEP) will provide a submittal to the U.S. Nuclear Regulatory Commission (NRC) that contains certain proprietary information owned by Simpson Gumpertz & Heger Inc. (SGH). SGH provided the information to VEP or a VEP affiliate to support the request made in Reference (1), and VEP is authorized to use this information. As explained in the attached affidavit, SGH's proprietary information contained in Reference (1) qualifies for withholding under the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 U.S.C. Section 552(b)(4), the Trade Secrets Act, 18 U.S.C. Section 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for trade secrets and commercial information. SGH respectfully requests that the NRC withhold this information from public disclosure. An affidavit supporting this request is attached.

In Reference (2), VEP consultant Structural Group, Inc. also made a similar request for certain other information contained in Reference (1).

Please contact me by phone at 781.907.9231 or email at RPOjdrovic@sgh.com if you have any questions concerning this request.

Kind regards,

Rasko Ojdrovic

Rasko P. Ojdrovic
Vice President and Senior Principal
Simpson Gumpertz & Heger Inc.

Attachment: 10 CFR 2.390 Affidavit

10 CFR 2.390 Affidavit

SIMPSON GUMPERTZ & HEGER INC.
10 CFR 2.390 AFFIDAVIT OF BEVERLY M. TOMPKINS

AFFIDAVIT

I, Rasko P. Ojdrovic, hereby state as follows:

(1) I am the Vice President and Senior Principal of Simpson Gumpertz & Heger Inc. (SGH), and I have been authorized to execute this affidavit on behalf of SGH.

(2) Virginia Electric and Power Company will submit a transmittal to the US NRC entitled "Proposed Alternative to ASME Section XI Requirements for Repair /Replacement of Circulating and Service Water Class 3 Buried Piping in Accordance with 10 CFR 50.55a(z)(1)," Docket Nos. 50-280 and 50-281, Serial No. 16-448. Certain portions of that transmittal contain proprietary information owned by SGH. This information should be held in confidence by the NRC and withheld from public disclosure. The following is a list of the SGH proprietary information in Virginia Electric and Power Company's transmittal that SGH requests be withheld:

- Enclosure 1, "Proposed Alternative and Basis for Use", Sections 8b-8e.
- Enclosure 4, Appendix C, "Watertightness Testing"
- Enclosure 5, "Design of Piping Repair for Plant CW and SW Class 3 Buried Piping using a CFRP System"
- Enclosure 7, "Sample Training Plans for Repair of Plant CW and SW Class 3 Buried Piping using a CFRP System," Sections 7F-7I
- Enclosure 8, "Failure Mode Effects Analysis – Repair of Plant CW and SW Class 3 Buried Piping using a CFRP System," Section 8A, 8C, 8D, 8E

(3) In making this application for withholding of proprietary information of which it is the owner, SGH believes that the information qualifies for withholding under the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 U.S.C. Section 552(b)(4), the Trade Secrets Act, 18 U.S.C. Section 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for trade secrets and commercial information because:

i. This information is and has been held in confidence by SGH.
ii. This information is of a type that is customarily held in confidence by SGH, and there is a rational basis for doing so because the information includes proprietary information that was developed and compiled by SGH at a significant cost to SGH. This information is classified as proprietary because it contains information relevant to analytical approaches and methodologies not available elsewhere.
iii. The information is being transmitted to the NRC voluntarily and in confidence.
iv. This information is not available in public sources and could not be gathered readily from other publicly available information.
v. A substantial effort has been expended by SGH to develop and evaluate this information. Public release of this information could lead to additional

v. A substantial effort has been expended by SGH to develop and evaluate this information. Public release of this information could lead to additional significant cost to SGH and is likely to cause substantial harm to SGH's competitive position and foreclose or reduce the availability of profit-making opportunities. The value of this information to SGH would be lost or devalued if the information were disclosed to the public.

vi. Public disclosure of the information sought to be withheld would provide other parties, including competitors, with valuable information. SGH's competitive advantage would be lost if its competitors are able to use the results of SGH's activities to aid their own commercial activities. For example, SGH's competitive advantage would be lost if its competitors are able to use the results of SGH's analyses to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive SGH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment.

vii. The commercial value of the information extends beyond the original development cost, and includes development of the expertise to determine and apply the appropriate evaluation process to the information. The research, development, engineering, and analytical costs that went into generating this information comprise a substantial investment of time and money by SGH. The precise value of this information is difficult to quantify, but clearly is substantial.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on November 30, 2016.

Rasko Ojdrovic

Rasko P. Ojdrovic